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This document describes Defense Medical Information System (DMIS) procedures for supporting direct care workload measurement and monitoring within the Military Health Services System (MHSS). Specifically, this document includes details concerning:

- Preparing inputs for and computing inpatient and ambulatory workload measures;
- Measuring and monitoring of case-mix changes;
- Maintaining direct care cost models used for Diagnosis Related Group (DRG) based resource allocation and other cost analyses;
- Updating Medical Treatment Facility (MTF) Peer Groups; and
- Maintaining DMIS databases and report generation software.

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VRI-DMIS-2.60 WP92-3
K. Dombkowski
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24 July 1992

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FOR REVIEW AND DISCUSSION
SUBJECT TO CHANGE

DMIS DIRECT CARE WORKLOAD MEASUREMENT AND MONITORING SUPPORT

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FOREWORD

This document describes Defense Medical Information System (DMIS) procedures for supporting direct care workload measurement and monitoring within the Military Health Services System (MHSS). Specifically, this document includes details concerning:

- preparing inputs for and computing inpatient and ambulatory workload measures;
- measuring and monitoring of case-mix changes;
- maintaining direct care cost models used for diagnosis related group (DRG) based resource allocation and other cost analyses;
- updating MTF Peer Groups; and
- maintaining DMIS databases and report generation software.

This report was prepared under contract number MDA903-88-C-0147.

Questions or comments should be directed to LTC Stu Baker, OASD(HA) Resource Analysis and Management Systems, (703) 756-1918.

CONTENTS

LIST OF EXHIBITS

1.0 EXECUTIVE SUMMARY

This document describes Defense Medical Information System (DMIS) procedures for supporting direct care workload measurement and monitoring within the Military Health Services System (MHSS). The DMIS provides information services that support the measurement of case-mix adjusted MHSS workload and financial resource management. These workload measures provide comparability between the direct care system and the CHAMPUS program as well as other civilian utilization and cost information. Further, these workload measures may be used as a basis for projecting and monitoring resource requirements in the Services' medical budget development process.

The DMIS develops and implements routine procedures for updating the Diagnosis Related Group (DRG) and ambulatory work unit (AWU) weights, inpatient length of stay outlier criteria, as well as direct care cost models. Further, results of these updates are summarized and presented to OASD(HA) to support policy considerations. Specifically, the DMIS provides workload measurement and monitoring support that may be organized into the seven categories summarized in the table below.

DMIS Direct Care Workload Measurement and Monitoring Support
1) Maintaining direct care DRG weights and outlier criteria
2) Assigning direct care DRGs and computation of inpatient work units
3) Maintaining direct care AWU weights and computation of ambulatory workload
4) Measuring and monitoring of case-mix "creep"
5) Maintaining direct care cost models
6) Updating MTF Peer Groups
7) Maintaining related DMIS databases and report generation software

These seven categories of DMIS support, combined with other OASD(HA) initiatives such as Encoder/Grouper, provide OASD(HA) with the

management information necessary to monitor and evaluate direct care utilization using case-mix adjusted workload measures. In part, this process closely parallels efforts sponsored by OCHAMPUS to support the CHAMPUS program's implementation of DRGs. As with the CHAMPUS program, the direct care program requires the performance of tasks that provide the foundation for the ongoing use of DRGs and other case-mix adjusted measures with direct care utilization data. The remainder of this chapter provides an overview of the information that supports DMIS case-mix adjusted workload measures as well as the OASD(HA) systems impacted by this information.

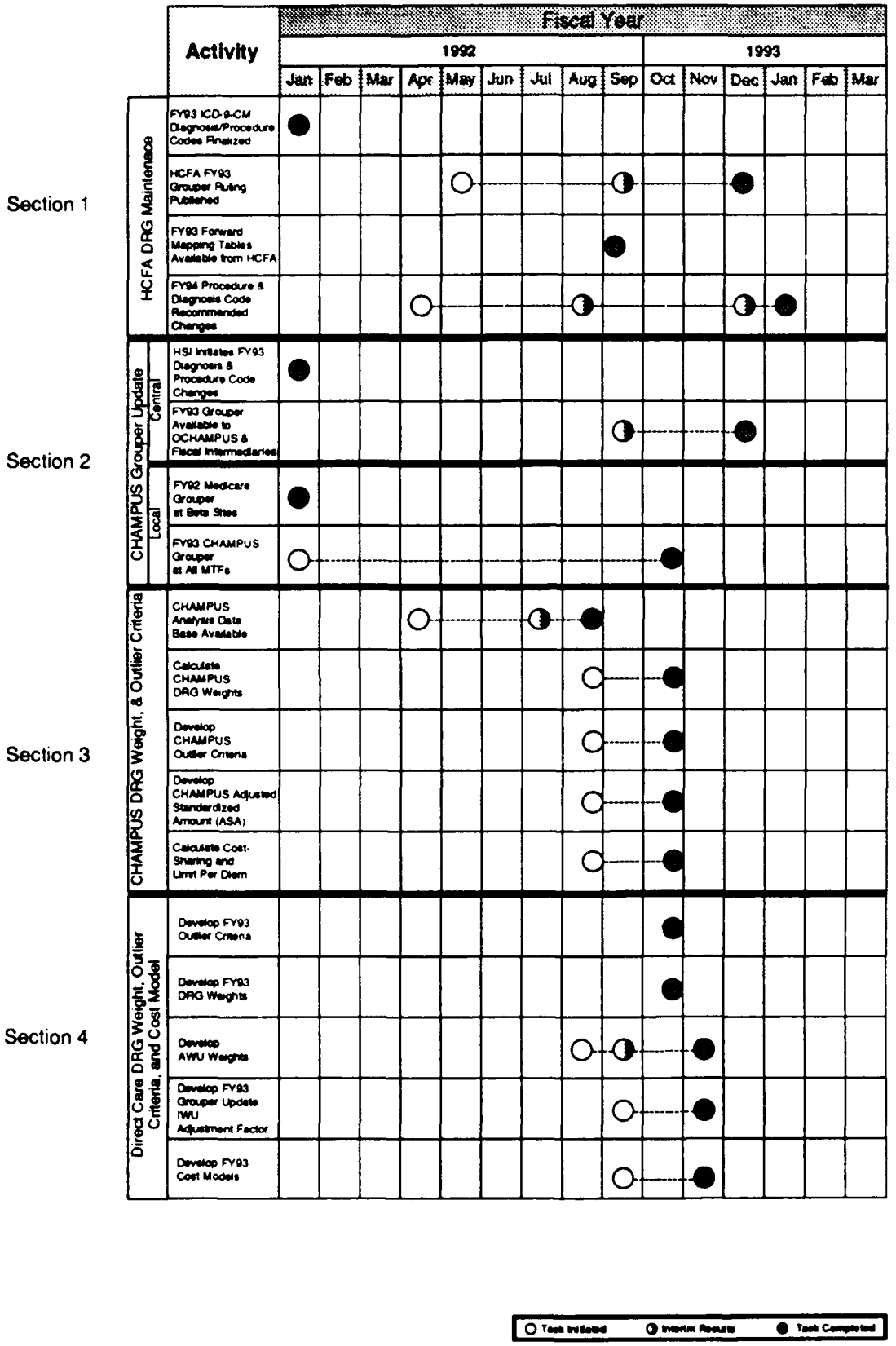
1.1 SUMMARY OF INFORMATION SOURCES

The DMIS draws information from numerous Service, OASD(HA), and other Federal sources to maintain annual direct care workload measurement and monitoring capabilities. Exhibit 1-1 provides a summary timeline that illustrates several aspects related to DMIS workload measurement and monitoring during FY92, and the preparation of DRG-based information for the upcoming fiscal year. Note that the development of direct care inpatient and ambulatory workload measures depends directly or indirectly on inputs from several sources including:

- Medicare prospective payment rules;
- CHAMPUS prospective payment rules;
- Medical Expense and Performance Reporting System (MEPRS);
- Service Biometrics departments;
- Service financial departments; and the
- DoD Civilian External Peer Review (CEPR) project.

The sequence of these activities is of critical importance in order to ensure information is available to OASD(HA) and MTF resource managers as close as possible to the outset of a given fiscal year.

EXHIBIT 1-1: DMIS WORKLOAD MEASUREMENT AND MONITORING SUPPORT TIMELINE



The first three sections of exhibit 1-1 -- HCFA DRG maintenance, CHAMPUS Grouper update, and CHAMPUS DRG weight and outlier criteria, show HCFA and CHAMPUS procedures. As will be described in greater detail in Chapter 2 of this document, these data are used by the DMIS in the routine establishment of inpatient workload in the form of relative weighted products (RWPs), case-mix indices (CMIs), and inpatient work units (IWUs), and ambulatory workload in the form of AWUs. Thus, the availability of DMIS workload measures is largely dependent upon timely, accurate, and complete data from each of these sources. For example, if the development of the interim central CHAMPUS grouper[1] is delayed, the development of CHAMPUS weights, outlier criteria, and ultimately direct care DRG weights and outlier criteria are likewise delayed. Similarly, complete and accurate direct care data from the Services are essential to the timely development of workload and case-mix adjustment factors, AWU weights, and direct care cost models. Delays in the availability of these source data can be managed in at least two ways:

- delay DMIS workload measurement related activities until complete and accurate data become available; or
- utilize more readily available sources of data, such as partial or previous years' data sets to compute parameters used with direct care workload.

Some inputs to the DMIS process may be considered critical and therefore delay DMIS production efforts. One example of a critical input would be CHAMPUS/Medicare DRG modifications that impact the grouper software development.

1.2 SUMMARY OF DMIS TASKS

Focusing on section 4 of exhibit 1-1, there are five tasks listed that are specifically DMIS direct care workload measurement and moni-

[1] Developed and maintained by 3M Health Information Systems for OCHAMPUS and the CHAMPUS fiscal intermediaries.

toring support activities. FY93 is used as an example, and details may differ for other fiscal years, but the general process should remain consistent. The tasks are to develop:

- FY93 outlier criteria;
- FY93 DRG weights;
- AWU weights;
- FY93 Grouper update IWU adjustment factors; and
- FY93 cost models.

These tasks are summarized below and described in greater detail in chapter 2.0.

FY93 DRG WEIGHTS AND OUTLIER CRITERIA

The preparation of FY93 (Version 10) direct care DRG weights, trim points, and geometric means of length of stay (GLOS), referred to as DRG weights and outlier criteria for simplicity, may be completed within a day or two after CHAMPUS weights and outlier criteria are available. The only task required is to modify weights that CHAMPUS takes directly from HCFA Medicare weights.

Weights for which CHAMPUS has insufficient observations to develop stable weights of their own are taken directly from Medicare without adjustment. These weights are not adjusted to be relative to other CHAMPUS weights. For the direct care system, a straightforward method of modifying these weights is used to create weights that are relative to all other weights. This methodology is described in greater detail in section 2.1.1 of chapter 2.0.

FY93 AWU WEIGHTS

The third task listed is to develop AWU weights. The majority of the work required to compute updated AWU weights may be completed as

soon as MEPRS data are available. The cost factors used to produce AWU weights are developed independent of any inpatient cost and workload information. These cost factors are then divided by the average cost per IWU to compute AWU weights. For computing AWU weights to be used in FY93, the most recent ambulatory expense and workload data available will be FY91 data. Much of these data have been provided to the DMIS, but a few facilities have yet to report data. As long as ambulatory cost and workload data that reporting facilities provided are complete, the AWU cost factors may be computed in advance since the cost factors are based on DoD average costs per visit. We anticipate, however, receiving data from non-reporting facilities shortly and are deferring computing AWU weights until these additional data are provided. If necessary, the weights will be computed without data from these non-reporting facilities.

Computing and evaluating cost factors takes less than one week, and deferring computation of the cost factors will not delay releasing updated cost models and workload measures. Since final AWU weights are normalized relative to inpatient cost per IWU, the IWU adjustment factors must be computed prior to finalizing the AWU weights. Thus, the FY93 (Version 10) DRG Grouper is required to compute the final AWU weights as well as to complete the remaining two tasks - developing IWU adjustment factors and updating the cost models.

FY93 IWU ADJUSTMENT FACTORS

The average cost per IWU, and IWU adjustment factors, will be computed using the most recent Service inpatient Biometrics data available. For FY93, the most recent inpatient Biometrics data that are anticipated to be available are third quarter FY92 data. The inpatient data must be grouped using both a base year Grouper and the Grouper that

will be used in FY93. FY93 will be an atypical year as data will be grouped using the Version 8, Version 9, and Version 10 Groupers such that adjustment factors for the Version 8 to Version 9 and Version 9 to Version 10 updates may be computed. This is necessary as the Version 9 grouper is currently not available to the DMIS for computing Version 8 to Version 9 adjustment factors. An alternative approach, if required because of time constraints, is to compute Version 8 to Version 10 adjustment factors for the cost models and AWU weights. Version 8 to Version 9 and Version 9 to Version 10 adjustment factors can then be computed at a later date.

Once data are grouped, the appropriate DRG weights and outlier criteria will be used to compute RWPs, CMIs, IWUs, and the necessary adjustment factors. Additionally, an average inpatient expense per Version 10 IWU will be computed such that FY93 AWU weights may be finalized. Grouping the data, computing RWPs, and developing the appropriate adjustment factors will take roughly four to five weeks. Thus, if the Grouper is available by mid-October, the adjustment factors and final AWU weights should be available by roughly mid-November.

FY93 UPDATED COST MODELS

To develop FY93 cost models, the IWU adjustment factors, inflation factors, and other adjustments, will be used to modify the model parameters. The cost models will not be re-estimated but simply updated or "maintained". Details relevant to cost model maintenance, and a discussion concerning model maintenance versus model re-estimation, are presented in section 2.5.1 of chapter 2.0.

One area of particular interest is the measurement and monitoring of both inpatient and ambulatory case-mix creep. Since the FY93 cost models will not be used for actual resource allocation, and the cost

models were updated with FY90 workload and cost data, it should not be necessary to complete an evaluation of case-mix creep prior to releasing FY93 cost models and workload measures. With the recent full deployment of the Encoder/Grouper, the next fiscal year will provide an opportunity to begin monitoring case-mix creep. General methods for measuring and monitoring case-mix creep are discussed in section 2.4.

1.3 SUMMARY OF OASD(HA) INFORMATION SYSTEM IMPACTS

DMIS support of case-mix adjusted workload measures impacts several systems currently deployed or under deployment in the MHSS. Systems impacted include the:

- core DMIS Database;
- Retrospective Case Mix Analysis System (RCMAS);
- Resource Analysis and Planning System (RAPS); and
- MTF Encoder/Grouper.

The central DMIS and RCMAS systems are impacted as these systems report case-mix adjusted direct care data. Although RAPS does not currently project workload in case-mix adjusted terms, i.e., IWUs and AWUs, the system has been targeted for a series of enhancements that provide for including case-mix adjusted workload and cost models. Finally, the MTF Encoder/Grouper is impacted by its use of CHAMPUS DRG weights and outlier criteria such that MTF-level case-mix adjusted workload is available at each facility in a more timely manner. The potential impacts of DMIS workload measurement and monitoring processes on each of these systems is considered in greater detail in Chapter 2.

The remainder of this document provides a detailed description of the DMIS procedures that support the implementation of direct care case-mix adjusted workload measures and related cost models. Chapter 2 is organized around the seven process categories presented above. Each

category's required inputs, process outputs, and the impacts of the process on other OASD(HA) information management activities, both internal and external to the DMIS, are presented.

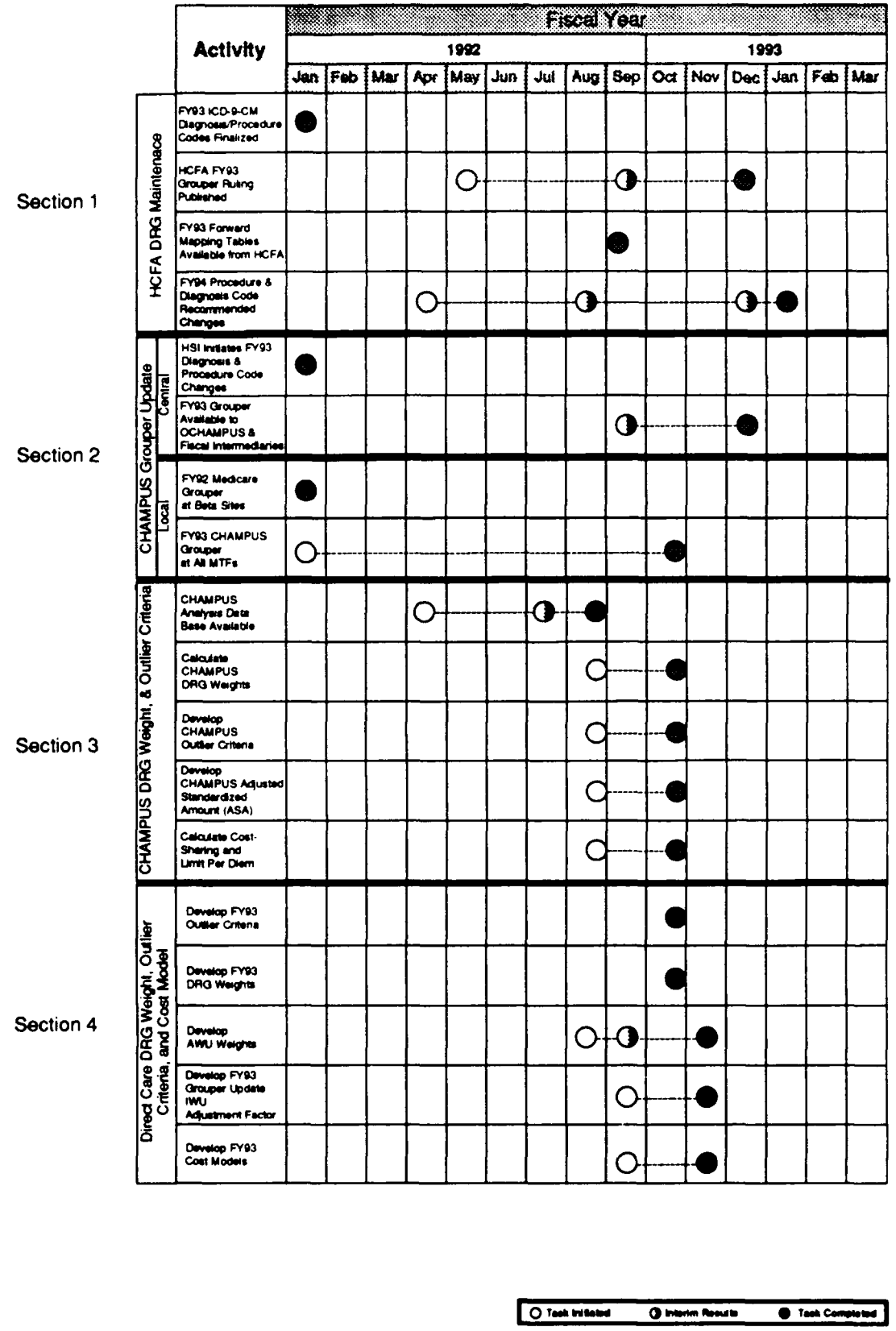
2.0 DMIS PROCEDURES FOR WORKLOAD MEASUREMENT AND MONITORING SUPPORT

This chapter provides an overview of each of the seven key activities routinely performed by the Defense Medical Information System (DMIS) in support of direct care workload measurement and monitoring systems, tools, and models. Each activity is described in terms of inputs, process, and outputs. Outputs used by other DMIS subsystems are also identified. This chapter is organized around these seven key activities:

- section 2.1 describes the development and maintenance of direct care DRG case weights and outlier criteria;
- section 2.2 presents the methodology for computing inpatient workload and case-mix measures;
- section 2.3 discusses developing and maintaining ambulatory work unit (AWU) weights;
- section 2.4 describes measuring and monitoring inpatient and ambulatory case-mix changes;
- section 2.5 discusses maintaining the direct care cost models;
- section 2.6 presents procedures for updating military medical treatment facility (MTF) Peer Groups; and
- section 2.7 discusses maintaining DMIS databases and standard reports.

Exhibit 2-1 presents a timeline for DMIS activities supporting DRG-based workload measurement and monitoring. The first three sections - HCFA DRG maintenance, CHAMPUS Grouper update, and CHAMPUS DRG weight and outlier criteria, show HCFA and CHAMPUS procedures. The results of these procedures are used by the DMIS in the routine establishment of inpatient measures in the form of relative weighted products (RWPs), case-mix indices (CMIs), and inpatient work units (IWUs). Ambulatory workload in the form of AWUs is also dependent upon this process as AWU weights are standardized to the average inpatient cost per IWU. Thus,

EXHIBIT 2-1: DMIS WORKLOAD MEASUREMENT AND MONITORING SUPPORT TIMELINE



the availability of DMIS workload measures is largely dependent upon timely, accurate, and complete data from each of these sources.

Section 4 of exhibit 1-1 shows that FY93 direct care DRG weights, DRG outlier criteria, and AWU weights should be available by the end of October, barring delays in obtaining FY93 CHAMPUS weights and outlier criteria. Additionally, updated FY93 cost models, and IWU adjustment factors, should be available by mid-November barring delays in obtaining Version 10 Grouper software, associated DRG weights, and outlier criteria.

In addition to timely CHAMPUS inputs, complete and accurate direct care data from the Services are essential to the development of workload and case-mix adjustment factors, AWU weights, and direct care cost models. Delays in the availability of these source data, however, may be more readily managed by either:

- delaying DMIS workload measurement related activities until complete and accurate data become available; or
- utilizing more readily available sources of data, such as partial or previous years' data sets to compute parameters used with direct care workload.

CHAMPUS/Medicare DRG modifications that impact the grouper software development, and associated weights and outlier criteria, are critical inputs and delays will be more difficult to manage.

2.1 DEVELOPING AND MAINTAINING DIRECT CARE DRG WEIGHTS AND OUTLIER CRITERIA

This section describes the development and maintenance of direct care DRG weights and outlier criteria. Outlier criteria include short- and long-stay thresholds (or trim points) and geometric means of length of stay (GLOS). In order to compute workload credit for each inpatient discharge, outlier criteria and weights are established for each DRG. The direct care DRG case weights and outlier criteria will be the

weights and outlier criteria published by CHAMPUS with minor modifications. Details concerning the development of FY91 (Version 8) weights and outlier criteria are presented in **Development and Impact of Implementing FY91 (Version 8) CHAMPUS DRG Weights and Outlier Criteria**.[1] The process of updating direct care DRG weights and outlier criteria entails two subtasks:

1) obtaining Medicare and CHAMPUS DRG weights and outlier criteria; and

2) adjusting weights and outlier criteria for direct care use.

The overall process of updating DRG weights and outlier criteria is summarized in the table below.

Summary of the DMIS DRG Weight and Outlier Criteria Process

Summary of Inputs:

- CHAMPUS DRG weights and outlier criteria for each DRG; and
- Medicare DRG weights and outlier criteria for each DRG.

Summary of the DMIS DRG Weight and Outlier Criteria Process:

- Adjust DRG weights for DRGs where CHAMPUS directly adopted Medicare weights; and
- prepare weights for DRGs that CHAMPUS does not reimburse prospectively.

Summary of Outputs:

- direct care DRG weights;
- direct care outlier criteria by DRG; and

Summary of Impacts:

- Direct care outlier criteria are used with subsequent years' data to compute workload credit. This information impacts all subsystems using DRG information, including DMIS Oracle tables, RCMAS and eventually by the Resource Analysis and Planning System (RAPS).

[1] VRI-DMIS-2.60 WP92-5, Vector Research, Incorporated, 20 May 1992.

The section that follows provides a detailed description of the tasks performed by the DMIS to update direct care DRG weights and outlier criteria.

2.1.1 DETERMINING DIRECT CARE DRG WEIGHTS AND OUTLIER CRITERIA

OASD(HA) policy is to update the grouper software, case weights, and outlier criteria annually to be congruent with CHAMPUS updates. Establishing direct care weights begins with a review of CHAMPUS assigned DRG weights for the respective fiscal year. The process used to develop FY91 (Version 8) weights and outlier criteria is used to illustrate the general methodology. As previously stated, CHAMPUS published weights and outlier criteria, with minor modifications, will be adopted for direct care use. Modifications include adjustments to DRGs that fall into one of the following categories:

- DRGs for which CHAMPUS directly adopted Medicare DRG weights; and
- DRGs that CHAMPUS does not reimburse based upon DRGs.

Historically, CHAMPUS has adopted Medicare DRG weights for DRGs that have insufficient claims to accurately establish a case weight. In FY91, CHAMPUS adopted 14 DRG weights directly from Medicare. OCHAMPUS, however, did not take into account the fact that on average CHAMPUS weights were approximately 16 percent higher than Medicare weights. To properly reflect resource requirements relative to the other CHAMPUS DRG weights, the direct care weights for the DRGs directly adopted by CHAMPUS from Medicare were increased by 16 percent. The outlier criteria for these DRGs were adopted directly from CHAMPUS without adjustment.

In FY91, two DRGs were not prospectively paid within the CHAMPUS

program.[1] For direct care use, these two DRGS were assigned the Medicare weights, adjusted by 16 percent as described above. Medicare long-stay thresholds and GLOS were adopted for these two DRGs without adjustment. The short-stay thresholds were set to 1 since Medicare does not use short-stay thresholds.

For FY91, all other DRG weights and outlier criteria were adopted directly from the CHAMPUS program without adjustment. As previously stated, OASD(HA) anticipates that this same basic procedure will be performed in the establishment of direct care FY92 (Version 9), FY93 (Version 10), and other future DRG weights and outlier criteria.

Once the preparation of direct care DRG weights has been completed, a summary of DRG weights and outlier criteria is developed for the direct care, CHAMPUS, and Medicare programs. Exhibit 2-2 provides an excerpt from the comparison developed for FY91 (Version 8) DRGs. For the direct care, CHAMPUS, and Medicare programs, and for each DRG, the summary provides the:

- DRG number;
- DRG title;
- geometric mean length of stay;
- short-stay threshold;[2]
- long-stay threshold; and
- relative case weight.

The table is maintained in spreadsheet form and it is anticipated that this table will be provided for each fiscal year as part of the on-line DMIS.

---

[1]The two DRGs not paid prospectively under the CHAMPUS program in FY91 were Heart Transplant (DRG 103) and Liver Transplant (DRG 480).

[2]The Medicare program does not employ short-stay outlier criteria. This is the same as assigning a short-stay outlier threshold of 1 day to all DRGs.

EXHIBIT 2-2: MEDICARE, CHAMPUS, AND DIRECT CARE VERSION 8 DRG WEIGHTS AND OUTLIER CRITERIA*

DRG	DRG TITLE	CHAMPUS ARITHMETIC LOS	CHAMPUS GLOS	MEDICARE GLOS	CHAMPUS LOW THRESHOLD	CHAMPUS HIGH THRESHOLD a	CHAMPUS HIGH THRESHOLD b	MEDICARE HIGH THRESHOLD	DIRECT CARE WEIGHT	CHAMPUS WEIGHT	MEDICARE WEIGHT
1	CRANIOTOMY AGE >17 EXCEPT FOR TRAUMA	13.2	10.1	12.9	1	39	27	42	3.8296	3.8296	3.3580
2	CRANIOTOMY FOR TRAUMA AGE >17	13.4	9.4	12.1	1	38	26	41	4.7208	4.7208	3.5485
3	CRANIOTOMY AGE 0-17	9.5	5.9	12.7	1	34	22	42	2.8052	2.8052	2.8830
4	SPINAL PROCEDURES	8.6	6.4	10.8	1	35	23	40	2.1169	2.1169	2.4532
5	EXTRACRANIAL VASCULAR PROCEDURES	5.5	4.7	5.8	1	26	14	35	1.7360	1.7360	1.5246
6	CARPAL TUNNEL RELEASE	2.4	2.0	2.0	1	14	7	19	0.6616	0.6616	0.4823
7	PERIPH & CRANIAL NERVE & OTHER NERV SYST PROC W CC	10.8	6.7	11.5	1	35	23	41	2.3772	2.3772	2.6823
8	PERIPH & CRANIAL NERVE & OTHER NERV SYST PROC W/O CC	3.4	2.4	3.0	1	24	10	32	0.8947	0.8947	0.7451
9	SPINAL DISORDERS & INJURIES	24.6	11.9	6.9	1	40	28	36	3.2092	3.2092	1.2229
10	NERVOUS SYSTEM NEOPLASMS W CC	10.4	6.4	7.8	1	35	23	37	1.5659	1.5659	1.2765
11	NERVOUS SYSTEM NEOPLASMS W/O CC	6.0	3.6	4.7	1	32	20	34	0.9778	0.9778	0.7771
12	DEGENERATIVE NERVOUS SYSTEM DISORDERS	13.0	7.2	6.9	1	36	24	36	1.9710	1.9710	0.9256
13	MULTIPLE SCLEROSIS & CEREBELLAR ATAXIA	7.1	5.3	7.1	1	34	22	36	0.9247	0.9247	0.8726
14	SPECIFIC CEREBROVASCULAR DISORDERS EXCEPT TIA	8.7	5.9	7.3	1	34	22	36	1.5377	1.5377	1.2212
15	TRANSIENT ISCHEMIC ATTACKS AND PRECEREBRAL OCCLUSIONS	3.8	3.1	4.2	1	21	10	33	0.7414	0.7414	0.6420
16	NONSPECIFIC CEREBROVASCULAR DISORDERS W CC	14.1	6.3	6.7	1	35	23	36	1.6854	1.6854	1.0703
17	NONSPECIFIC CEREBROVASCULAR DISORDERS W/O CC	6.0	3.9	4.4	1	32	20	33	1.0644	1.0644	0.6326
18	CRANIAL & PERIPHERAL NERVE DISORDERS W CC	6.2	4.6	6.0	1	33	21	35	0.9274	0.9274	0.8749
19	CRANIAL & PERIPHERAL NERVE DISORDERS W/O CC	4.8	3.3	3.9	1	32	16	33	0.6960	0.6960	0.5629
20	NERVOUS SYSTEM INFECTION EXCEPT VIRAL MENINGITIS	9.6	7.4	8.4	1	36	24	37	1.8427	1.8427	1.8683
21	VIRAL MENINGITIS	4.1	3.5	7.5	1	18	10	37	0.6273	0.6273	1.4439
22	HYERTENSIVE ENCEPHALOPATHY	4.5	3.3	4.4	1	29	13	33	0.8183	0.8183	0.7206
23	NONTRAUMATIC STUPOR & COMA	2.8	2.2	4.3	1	16	8	33	0.6934	0.6934	0.8322
24	SEIZURE & HEADACHE AGE > 17 W CC	4.6	3.6	5.3	1	31	14	34	0.8443	0.8443	0.9602
25	SEIZURE & HEADACHE AGE > 17 W/O CC	3.6	2.8	3.5	1	22	10	28	0.5386	0.5386	0.5197
26	SEIZURE & HEADACHE AGE 0-17	3.2	2.4	4.0	1	19	9	33	0.5357	0.5357	0.8176
27	TRAUMATIC STUPOR & COMA, COMA>1 HR	9.1	4.3	4.3	1	33	21	33	2.2539	2.2539	1.3481
28	TRAUMATIC STUPOR & COMA, COMA <1 HR AGE >17 W CC	6.8	4.6	5.9	1	33	21	35	1.2917	1.2917	1.2060
29	TRAUMATIC STUPOR & COMA, COMA <1 HR AGE >17 W/O CC	7.5	3.5	3.3	1	32	20	32	1.2370	1.2370	0.5674
30	TRAUMATIC STUPOR & COMA <1 HR AGE 0-17	3.1	2.0	2.0	1	23	10	17	0.5955	0.5955	0.3496
31	CONCUSSION AGE >17 W CC	3.2	2.2	4.2	1	21	9	33	0.6317	0.6317	0.6933
32	CONCUSSION AGE >17 W/O CC	2.4	1.8	2.7	1	13	6	25	0.4484	0.4484	0.4100
33	CONCUSSION AGE 0-17	1.4	1.3	1.6	1	4	2	9	0.2882	0.2882	0.2427
34	OTHER DISORDERS OF NERVOUS SYSTEM W CC	9.5	5.3	6.0	1	34	22	35	2.1045	2.1045	1.1714
35	OTHER DISORDERS OF NERVOUS SYSTEM W/O CC	8.3	3.7	3.6	1	32	20	33	1.1231	1.1231	0.5464
36	RETINAL PROCEDURES	2.4	2.0	2.3	1	10	5	13	0.7892	0.7892	0.6487
37	ORBITAL PROCEDURES	2.9	2.2	2.9	1	21	9	32	0.8711	0.8711	0.7431
38	PRIMARY IRIS PROCEDURES	0.0	2.2	2.2	1	17	17	17	0.4195	0.3614	0.3614
39	LENS PROCEDURES WITH OR WITHOUT VITRECTOMY	1.5	1.3	1.6	1	5	3	8	0.7245	0.7245	0.4456
40	EXTRAOCULAR PROCEDURES EXCEPT ORBIT AGE >17	2.1	1.6	2.0	1	12	6	21	0.6147	0.6147	0.4923
41	EXTRAOCULAR PROCEDURES EXCEPT ORBIT AGE 0-17	1.5	1.2	1.6	1	5	3	7	0.4929	0.4929	0.3613
42	INTRAOCULAR PROCEDURES EXCEPT RETINA, IRIS & LENS	2.6	2.1	2.2	1	14	7	16	0.8275	0.8275	0.6202
43	HYPHEMA	3.6	2.9	4.0	1	23	11	32	0.2827	0.2827	0.3867
44	ACUTE MAJOR EYE INFECTIONS	3.9	3.4	5.5	1	16	9	35	0.4690	0.4690	0.5979
45	NEUROLOGICAL EYE DISORDERS	3.7	2.8	3.4	1	27	12	29	0.6138	0.6138	0.5650
46	OTHER DISORDERS OF THE EYE AGE >17 W CC	5.6	3.1	4.2	1	32	20	33	0.8169	0.8169	0.6701
47	OTHER DISORDERS OF THE EYE AGE >17 W/O CC	3.2	2.2	2.6	1	24	10	28	0.5074	0.5074	0.3606
48	OTHER DISORDERS OF THE EYE AGE 0-17	2.8	2.2	2.9	1	16	7	30	0.4422	0.4422	0.3969
49	MAJOR HEAD & NECK PROCEDURES	9.1	6.2	7.4	1	35	23	36	2.2905	2.2905	2.3273
50	SIALOADENECTOMY	1.9	1.7	2.2	1	6	4	14	0.7318	0.7318	0.6413

*The direct care low and high thresholds are equivalent to the CHAMPUS low and high threshold "a", respectively.

One aspect of establishing DRG weights and outlier criteria requires that this information be prepared prospectively. That is, weights and outlier criteria for a given version of DRGs must be developed concurrently with the DRGs being implemented. The requirement arises in conjunction with the DoD Encoder/Grouper software deployment as well as the necessity of prospectively developing adjustments to cost models.

MTFs and the Services will also need the capability to assign workload based upon the DoD methodology to analyze workload and prospective resource credits as the fiscal year progresses. MTF-level computation of workload provides a timely means for MTFs to request mid-course budget reviews and corrections when workloads are substantially different from those upon which budgets have been based. Clearly, the DMIS development of direct care DRG cutpoints and weights must be completed as quickly as possible in order for MTFs to use the information early in the fiscal year.

The CHAMPUS grouper, case weights, and outlier criteria are a key input to this process, their availability is of primary consideration in the data processing schedule. The availability of the CHAMPUS grouper software, however, is dependent upon the availability of the HCFA grouper. As the HCFA grouper is updated each year, the resultant grouper must be modified to reflect CHAMPUS-unique DRGs for DoD use. This is typically accomplished by mid-September each year. Once completed, the CHAMPUS grouper is made available to CHAMPUS fiscal intermediaries as well as the DMIS.

As shown in exhibit 2-1, final weights and outlier criteria are typically available in mid-October. Thus, barring unexpected difficulties, interim DRG Grouper software, case weights, and outlier criteria should be available at MTFs near the end of October.

Additionally, updated cost models should be available by mid-November of the fiscal year of application. Having described the procedures for developing and maintaining direct care DRG weights and outlier criteria, section 2.2 discusses computing inpatient workload and case-mix measures.

2.2 COMPUTING INPATIENT WORKLOAD AND CASE-MIX MEASURES

Determining RWPs, CMIs, and IWUs is an integral part of the routine DMIS processing of Standard Inpatient Data Record (SIDR) data. Workload in the form of RWPs is assigned to each direct care inpatient discharge record reported to the DMIS. Ultimately, CMIs and IWUs are computed based upon the sum of RWPs over all cases reported, for each respective MTF.[1] The DMIS process for the assignment of workload to each inpatient direct care record is summarized in the table below.

Summary of the DMIS Inpatient Workload and Case-Mix Assignment Process

Summary of Inputs:

- DMIS RWP assignment software (SAS code)[2];
- direct care DRG weights and outlier criteria;
- current and subsequent years' DRG Grouper Software and
- direct care Service Biometrics discharge records.

--Continued--

[1] A complete description of the computation of Relative Weighted Products (RWPs) and Inpatient Work Units (IWUs) is found in **Development and Impact of Implementing FY91 (Version 8) CHAMPUS DRG Weights and Outlier Criteria**, VRI-DMIS-2.60 WP92-5, 20 May 1992.

[2] The SAS code used to assign RWPs to each record is documented in **SIDR Relative Weighted Product (RWP) Assignment Process**, VRI-DMIS-2.60 WP92-10, Vector Research, Incorporated, 15 July 1992.

Summary of the DMIS Inpatient Workload and Case-Mix Assignment Process (Concluded)

Summary of Outputs:

- standard DMIS SIDR record archive tape with DRGs and RWPs assigned using current year's DRG Grouper Software;
- standard DMIS SIDR record archive tapes with DRGs and RWPs assigned based upon "forward grouped" DRGs (i.e., using the next year's DRG Grouper Software). These data are used to compute case-mix changes due to DRG grouper updates.(see section 2.4 for additional discussion); and
- DMIS Oracle tables containing aggregate workload in the form of IWUs for each MTF.

Summary of Impacts:

- Direct care discharge records with RWPs based upon current year DRGs are used by RCMAS, DMIS Oracle tables, and are eventually to be used by RAPS. These data also serve as the basis for DoD resource allocation and related analyses.
- Direct care discharge records with RWPs based upon the upcoming year's DRGs are used to compute CMI shifts as a result of grouper updates. Correction factors to ensure a consistent IWU definition are computed based upon these data.

As a part of routine DMIS processing, SIDR data are assigned standard DMIS codes, DRGs, and archived in a record format that is identical for all three Services. Workload assignment is typically performed on the cumulative fiscal year datasets provided by the Services to the DMIS, although enhancements in data flow to the DMIS may support quarterly (or even monthly) data processing cycles. Currently, quarterly processing by the DMIS is restricted to ad hoc support of the RCMAS program. However, it is anticipated that OASD(HA) will adopt quarterly processing as a DMIS standard procedure.

Under current DMIS processing procedures, at least two versions of DRGs are ultimately assigned to each cumulative fiscal year data set. The assignment of "forward grouped" DRGs is required to measure and monitor case-mix changes due to updating the grouper, case weights, and outlier criteria. (see section 2.4). Current year DRGs are also assigned using the respective fiscal year's grouper as the basis for

direct care workload assignment. These data are disseminated for analysis and monitoring via the DMIS family of tools including RCMAS, Oracle tables, and RAPS. Thus, the inpatient workload assignment may be divided into two categories: retrospective DRG and workload assignment for historical workload measurement and monitoring and prospective DRG assignment to evaluate the expected impact of updating to new grouper software and associated weights and outlier criteria.

2.2.1 RETROSPECTIVE DRG AND WORKLOAD ASSIGNMENT

Workload assignment is dependent upon several inputs in addition to the direct care discharge record. Each discharge record is assigned a DRG using the grouper version appropriate for the respective fiscal year, e.g., Version 8 [illegible]. The workload assignment process computes RWPs for each discharge based upon the appropriate relative weights and outlier criteria for the respective DRG.

As the DMIS moves toward routinely processing quarterly data it will be essential that outlier criteria for direct care workload assignment be available by the time the first quarter data are received by the DMIS. Further, it is anticipated that DRG weights and outlier criteria will be made available with the encoder-grouper deployment in order to allow MTFs to compute RWPs in a timely manner. CHAMPUS outlier criteria are typically available by mid-October of the fiscal year of interest. For example, FY93 (Version 10) DRG weights and outlier criteria are expected to be available by 15 October, 1992. The resulting data are disseminated for analysis and monitoring via the DMIS family of tools.

2.2.2 PROSPECTIVE DRG AND WORKLOAD ASSIGNMENT

The assignment of "forward grouped" DRGs is required to measure and monitor case-mix changes anticipated due to updating the grouper, case weights, and outlier criteria. Thus, the most current inpatient Service Biometrics data will be assigned DRGs and workload using the FY93 (Version 10) Grouper and associated weights and outlier criteria. The resulting CMIs and RWPs will be compared to results using the FY92 (Version 9) Grouper and associated weights and outlier criteria to estimate the impact of updating groupers and adjust the cost models to reflect the updated inpatient workload measure. Sections 2.4 and 2.5 present greater detail concerning updating the cost models to adjust for new workload measures.

2.3 MAINTAINING AMBULATORY WORK UNIT (AWU) WEIGHTS

Direct care ambulatory workload has traditionally been measured by clinic visits, typically by hospital workcenter. One limitation of this measure is that simple counts of visits do not reflect the wide variation of resource requirements that exist between different types of visits. Variations in the conditions being treated, procedures performed, setting in which services were provided, and provider specialty all impact the resource intensity of a visit.

Ideally, encounter-level ambulatory data would provide sufficient precision to accurately identify variations in resource requirements between different services provided in the ambulatory setting. Detailed patient-level ambulatory data that provide the basis for measurements, such as Ambulatory Visit Groups (AVGs), are an outpatient counterpart to DRGs. Similarly, the Resource Based Relative Value Scale (RBRVS) weights provide a means of computing professional resource requirements for ambulatory care. At this time, the direct care system lacks the

capability to record and track patient-level ambulatory data necessary for these precise resource measures.

As an interim step, until more precise ambulatory data become available system-wide, a visit-based measure of ambulatory resource intensity known as the ambulatory work unit (AWU) has been developed. The table below summarizes the DMIS procedures for computing AWU weights.

Summary of the DMIS AWU Weight Computation Process

Summary of Inputs:

- MEPRS ambulatory cost and visit data for each 3rd level workcenter; and
- average DoD expense per Inpatient Work Unit

Summary of Outputs:

- Ambulatory Work Unit weights for each 3rd level workcenter;
- AWUs aggregated by MTF in DMIS Oracle tables; and
- analysis of AWU weight and AWU workload level changes.

Summary of Impacts:

- AWU weights are used in the computation of annual ambulatory workloads for MTFs and the Services. AWUs and MEPRS ambulatory expenses are inputs to the maintenance of direct care cost models.

The AWU weights reflect variations in the average cost per visit between the MEPRS 3rd level workcenters. While these weights are not as precise as other measures, they may be computed based upon aggregate-level data that are routinely reported throughout the MHSS. The remainder of this section provides a discussion of the procedures required to update AWU weights and the analysis performed to monitor changes in workload that result from AWU updates.

2.3.1 COMPUTING AWU WEIGHTS

The procedure for calculating AWU weights is based upon the methodology described in **Military Health Service System Ambulatory Work**

Unit (AWU).[1] The AWU weights were most recently updated using FY90 MEPRS cost and visit data. This update was documented in **FY90 Based Ambulatory Work Unit (AWU) Weight Development**[2]. The procedures used by the DMIS for the development of the AWU weights and AWUs are briefly summarized below.

The computation of AWUs begins with the development of AWU weights for each of roughly 60 MEPRS ambulatory workcenters or subaccounts. AWU weights and AWUs are based upon MEPRS cost and visit data for outpatient ("B") accounts reported at the 3rd character workcenter level of detail. These costs include stepped-down support and ancillary expenses in addition to direct charges. Simply stated, the AWU weight is a relative measure of each workcenter's average cost per visit, which has been scaled to the average cost per IWU. The scaling of the AWU weights allows AWUs to be combined with IWUs to form a comprehensive measure of MTF workload known as medical work units (MWUs).

The average cost per visit is employed as the representative measure of workcenter relative cost. Due to differences in distributions of costs per visit within each workcenter, this "average" is based on either the arithmetic mean, square transformed mean, geometric mean, or median depending upon the presence of outliers and the skewness of MTF costs per visit with a given workcenter.[3] The selected measure of workcenter average cost per visit is divided by the DoD-wide average cost per IWU to scale the AWU weight relative to inpatient costs.

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[1] Optenburg, et al, Report HR88-001, Health Care Studies and Clinical Investigation Activities, 1 April 1988.

[2] VRI-DMIS-2.60 WP92-8, Vector Research, Incorporated, 20 May 1992.

[3] See Optenburg et al for complete details regarding the selection of the appropriate "average" cost per visit for a given workcenter used to establish AWU weights.

After computing a weight for each workcenter, total visits within each workcenter may be multiplied by the appropriate weight to obtain AWUs. These AWUs may then be summed at various levels to obtain a measure of ambulatory workload in terms of AWUs. The process described is analogous to that used to compute DRG weights and RWPs within the inpatient setting. Instead of patient level data, however, workcenter visit data are the greatest level of detail.

2.3.2 MONITORING AWU WEIGHTS

Once AWU weights have been established for a given year, the results are reviewed relative to prior years' AWU weights to detect trends or fluctuations. Exhibit 2-3 illustrates an example of a comparative table that is assembled to analyze AWU weights. After establishing final AWU weights, each MTF's observed MEPRS ambulatory visits are multiplied by the appropriate weight at the workcenter level to compute AWUs. Exhibit 2-4 illustrates an example of a comparative exhibit prepared to review the impact of updating AWU weights.

It is anticipated that the AWU weights will be updated annually using the most current MEPRS ambulatory cost and visit data. Thus, AWU weights based on FY91 MEPRS data will be developed and employed with the FY93 (Version 10) Grouper, case weights, and outlier criteria barring any delays in obtaining FY91 MEPRS data. As shown in exhibit 2-1, it is expected that the AWU weights to be used with the FY93 Grouper will be completed by the end of October. Having reviewed the procedures for computing and maintaining AWU weights and AWUs, section 2.4 discusses methods for measuring and monitoring inpatient and ambulatory case-mix changes.

EXHIBIT 2-3: FY90 BASED AWU WEIGHTS AND A COMPARISON TO FY85 WEIGHTS

Workcenter	Description	FY85 AWU Weight	FY89 AWU Weight	FY90 AWU Weight	FY89 Observations	FY90 Observations	FY89 - FY90 Percentage Difference	FY90 Adjusted Weight	FY90 Final Weight	FY85 - FY90 Percentage Difference
BAA	Internal Medicine	0.0395	0.0392	0.0403	158	162	2.8%		0.0403	2.0%
BAB	Allergy	0.0083	0.0080	0.0077	137	142	-3.8%		0.0077	-7.2%
BAC	Cardiology	0.0364	0.0252	0.0313	39	41	24.2%	0.0257	0.0257	-29.4%
BAE	Diabetic	0.0267	0.0237	0.0222	11	10	-6.3%		0.0222	-16.9%
BAF	Endocrinology	0.0399	0.0347	0.0366	20	19	5.5%		0.0366	-8.3%
BAG	Gastroenterology	0.0338	0.0358	0.0343	35	35	-4.2%		0.0343	1.5%
BAH	Hematology	0.0455	0.0490	0.0480	19	19	-2.0%		0.0480	5.5%
BAI	Hypertension	0.0232	0.0188	0.0184	14	13	-2.1%		0.0184	-20.7%
BAJ	Nephrology	0.0629	0.0522	0.0584	19	19	11.9%		0.0584	-7.2%
BAK	Neurology	0.0364	0.0402	0.0402	55	56	0.0%		0.0402	10.4%
BAL	Nutrition	0.0127	0.0085	0.0090	146	145	5.9%		0.0090	-29.1%
BAM	Oncology	0.0466	0.0370	0.0369	23	23	-0.3%		0.0369	-20.8%
BAN	Pulmonary Disease	0.0410	0.0335	0.0341	26	27	1.8%		0.0341	-16.8%
BAO	Rheumatology	0.0343	0.0299	0.0358	17	19	19.7%	0.0323	0.0323	-5.8%
BAP	Dermatology	0.0216	0.0216	0.0207	91	93	-4.2%		0.0207	-4.2%
BAQ	Infectious Disease	0.0395	0.0194	0.0257	17	19	32.5%	0.0213	0.0213	-46.1%
BAR	Physical Medicine	0.0395	----	0.0352	0	11			0.0352	-10.9%
BAZ	Medical Clinic NEC	0.0395	0.0223	0.0259	4	4	16.1%		0.0259	-34.4%
BBA	General Surgery	0.0345	0.0333	0.0352	154	155	5.7%		0.0352	2.0%
BBB	Cardiovascular and Thoracic Surgery	0.0377	0.0402	0.0427	18	18	6.2%		0.0427	13.3%
BBC	Neurosurgery	0.0583	0.0464	0.0507	19	18	9.3%		0.0507	-13.0%
BBD	Opthalmology	0.0276	0.0273	0.0282	91	92	3.3%		0.0282	2.2%
BBE	Organ Transplant	0.0723	0.1091	0.0990	2	2	-9.3%		0.0990	36.9%
BBF	Otolaryngology	0.0305	0.0264	0.0247	104	108	-6.4%		0.0247	-19.0%
BBG	Plastic Surgery	0.0406	0.0350	0.0382	20	21	9.1%		0.0382	-5.9%
BBH	Proctology	0.0234	0.0236	0.0252	11	14	6.8%		0.0252	7.7%
BBI	Urology	0.0397	0.0378	0.0394	86	93	4.2%		0.0394	-0.8%
BBJ	Pediatric Surgery	0.0496	0.0232	0.0355	3	1	53.0%	0.0268	0.0268	-46.0%
BBZ	Surgical Clinics NEC	0.0345	0.0188	0.0129	2	2	-31.4%	0.0156	0.0156	-54.8%
BCA	Family Planning	0.0249	0.0274	0.0280	48	48	2.2%		0.0280	12.4%
BCB	Gynecology	0.0236	0.0236	0.0255	174	174	8.1%		0.0255	8.1%
BCC	Obstetrics	0.0260	0.0259	0.0265	157	152	2.3%		0.0265	1.9%
BDA	Pediatrics	0.0200	0.0189	0.0188	183	183	-0.5%		0.0188	-6.0%
BDB	Adolescent	0.0254	0.0211	0.0195	29	28	-7.6%		0.0195	-23.2%
BDC	Well Baby	0.0156	0.0144	0.0137	138	144	-4.9%		0.0137	-12.2%
BDZ	Pediatrics Clinics NEC	0.0200	0.0291	0.0493	41	13	69.4%	0.0330	0.0330	65.0%

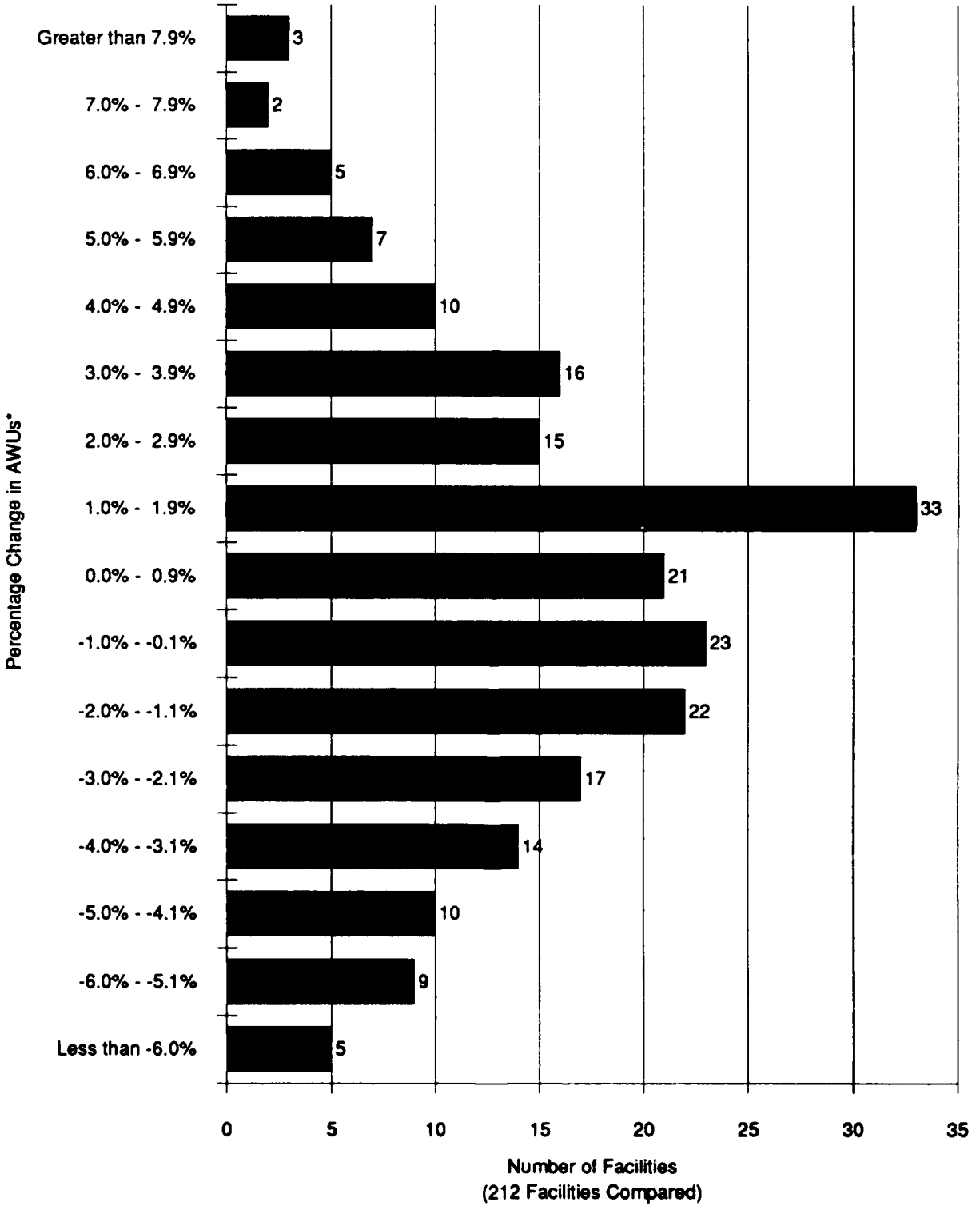
--Continued--

EXHIBIT 2-3: FY90 BASED AWU WEIGHTS AND A COMPARISON TO FY85 WEIGHTS (Concluded)

Workcenter	Description	FY85 AWU Weight	FY89 AWU Weight	FY90 AWU Weight	FY89 Observations	FY90 Observations	FY89 - FY90 Percentage Difference	FY90 Adjusted Weight	FY90 Final Weight	FY85 - FY90 Percentage Difference
BEA	Orthopedics	0.0362	0.0320	0.0320	128	137	0.0%		0.0320	-11.6%
BEB	Cast	0.0200	0.0153	0.0147	76	77	-3.9%		0.0147	-26.5%
BEC	Hand Surgery	0.0232	0.0246	0.0247	8	9	0.4%		0.0247	6.5%
BED	Neuromusculoskeletal Screening	0.0133	0.0174	0.0159	15	14	-8.6%		0.0159	19.5%
BEE	Orthopedic Appliance	0.0326	0.0260	0.0235	52	49	-9.6%		0.0235	-27.9%
BEF	Podiatry	0.0211	0.0173	0.0189	83	85	9.2%		0.0189	-10.4%
BFA	Psychiatric	0.0346	0.0335	0.0329	71	72	-1.8%		0.0329	-4.9%
BFB	Psychology	0.0295	0.0276	0.0276	65	64	0.0%		0.0276	-6.4%
BFC	Child Guidance	0.0279	0.0270	0.0232	21	20	-14.1%	0.0262	0.0262	-6.1%
BFD	Mental Health	0.0332	0.0318	0.0313	146	144	-1.6%		0.0313	-5.7%
BFE	Social Work Services	0.0213	0.0244	0.0259	129	131	6.1%		0.0259	21.6%
BFF	Substance Abuse	0.0332	0.0210	0.0226	112	111	7.6%		0.0226	-31.9%
BFZ	Psychiatric Clinics NEC	0.0346	----	----	0	0			0.0329	-4.9%
BGA	Family Practice	0.0268	0.0233	0.0245	118	122	5.2%		0.0245	-8.6%
BHA	Primary Care	0.0263	0.0251	0.0258	161	157	2.8%		0.0258	-1.9%
BHB	Medical Exams	0.0326	0.0309	0.0289	70	70	-6.5%		0.0289	-11.3%
BHC	Optometry	0.0163	0.0160	0.0164	198	191	2.5%		0.0164	0.6%
BHD	Audiology	0.0150	0.0154	0.0136	73	76	-11.7%		0.0136	-9.3%
BHE	Speech Pathology	0.0232	0.0193	0.0177	27	27	-8.3%		0.0177	-23.7%
BHF	Community Health	0.0389	0.0215	0.0182	59	58	-15.3%	0.0201	0.0201	-48.3%
BHG	Occupational Health	0.0255	0.0229	0.0224	94	90	-2.2%		0.0224	-12.2%
BHH	PRIMUS/NAVCARE	0.0263	0.0186	0.0182	9	10	-2.2%		0.0182	-30.8%
BHI	Immediate Care Clinic	0.0263	----	0.0236	0	7			0.0236	-10.3%
BHZ	Primary Medical Care Clinics NEC	0.0263	----	----	0	0			0.0258	-1.9%
BIA	Emergency Medical	0.0335	0.0381	0.0410	179	173	7.6%		0.0410	22.4%
BJA	Flight Medicine	0.0286	0.0325	0.0328	175	178	0.9%		0.0328	14.7%
BKA	Undersea Medicine	0.0304	0.0256	0.0133	2	2	-48.0%	0.0128	0.0128	-57.9%

Average Change	2.1%	Average Change	-8.5%
STD of Change	16.0%	STD of Change	20.7%
Avg. + 1 STD	18.1%	Avg. + 1 STD	12.2%
Avg. - 1 STD	-13.8%	Avg. - 1 STD	-29.3%

EXHIBIT 2-4: HISTOGRAM OF PERCENTAGE CHANGE IN FACILITY FY90 AWUs USING FY85 AND FY90 BASED WEIGHTS



* A percentage change less than zero indicates the AWUs using FY90 weights are less than that using FY85 weights

2.4 MEASURING AND MONITORING INPATIENT AND AMBULATORY CASE-MIX "CREEP"

Case-mix changes, frequently referred to as case-mix "creep" since the change is often an increase in case-mix, may be broken down into three components:

- real changes in average case-mix complexity;
- artificial case-mix changes due to MTF coding practices; and
- artificial case-mix changes due to updated grouper versions.

Actual changes in case-mix may occur for many reasons, but all result in either relatively more complex admissions or fewer less complex cases being observed within the inpatient or ambulatory setting. For example, the movement of same day surgeries from the inpatient environment to ambulatory environment will cause in an increase in observed inpatient average case complexity, and an increase in ambulatory average case complexity, all else being equal. Also, as a population ages there is, on average, greater resource intensity requirements per admission and outpatient visits. Thus, a facility that admits relatively more retirees and their dependents may observe a legitimate increase in case-mix complexity. These types of effects must be distinguished from artificial changes.

The inputs, outputs, and impacts of the DMIS measurement and monitoring of inpatient case-mix creep are summarized in the table below and discussed in sections 2.4.1 and 2.4.2. Each of the aspects of case-mix creep is considered below. Methods for monitoring ambulatory case-mix changes are discussed in section 2.4.3.

Summary of the DMIS Case-Mix Monitoring Process

Summary of Inputs:

- average case-mix for each DRG grouper version.

Summary of Outputs:

- correction factors for IWU estimation; and

Summary of Impacts:

- Direct care workload in terms of RWPs must be corrected for DRG creep effects while computing IWUs. In effect, the conversion factor of .8109 that has been used to convert CMI to RCMI is only valid within version 4 DRGs. As updated versions are used to compute workload, corrections must be made. Further, as DRGs begin to be assigned at the MTF level, additional correction may need to be made.

2.4.1 INPATIENT CASE-MIX CHANGES DUE TO MTF CODING PRACTICES

Currently, DRGs are assigned centrally by the DMIS in a retrospective manner. However, as the DoD Encoder/Grouper software is deployed throughout DoD, MTFs will begin to assign DRGs to each SIDR in a concurrent manner. The encoder function will assist MTF medical records staff in assigning the most accurate diagnosis codes, which ultimately drive DRG assignment. Information regarding the relative weight (and hence, resource credit) will presumably be available to the MTFs and thus, there may be a tendency toward "upcoding", which is the assignment of a DRG with a higher case weight when alternative DRGs are presented for a given case. The net impact of this behavior is known as "DRG creep", which may result in an apparent shift in average case-mix complexity.

The phenomenon of DRG creep has been observed in the Medicare program due to upcoding by civilian hospitals.[1] Since the DoD

[1]Case-mix creep in civilian hospitals is monitored by the Prospective Payment Assessment Commission (ProPAC). Additional details are provided in **Case-Mix Change: How Much Change in the Case-Mix Index is DRG Creep?**, RAND Corporation, Technical Report E-90-05, April 1990.

Encoder/Grouper was only recently fully deployed, it is not clear whether or not upcoding will occur to a significant degree at MTFs. However, the DMIS can provide support to OASD(HA) in monitoring case-mix complexity as the DoD Encoder/Grouper is deployed in order to assess impacts on workload measurement.

Ideally, the monitoring of MTF coding practices would be based on comparing the computed case-mix resulting from MTF abstracted records and the assigned DRG to some "standard" abstracting methodology and the assigned DRG. The coding validation study implemented by the Civilian External Peer Review (CEPR) project is an example of comparing standard abstracting results, obtained from an independent abstractor, to MTF abstracting results, in terms of assigned DRG and subsequent case-mix values. If the difference in case-mix between the standard and MTF abstracting methodologies remains constant over time, then the result is that no case-mix creep was found due to changes in MTF coding practices. Differences in case-mix under these conditions would be attributed solely to inherent differences in abstracting methodologies. If the difference in the case-mix measured using the standard and MTF abstracting results changes over time, however, and in particular if the case-mix using MTF abstracted results increases relative to the standard, then case-mix creep most likely has occurred.

In more concrete terms, assume the case-mix for a sample of records for a given period of time, at selected facilities using a standard methodology, is 1.0000 at some time T. Additionally, the observed case-mix using MTF abstracting results for the same period at these selected facilities at time T is found to be 1.0005. The ratio of the MTF resulting case-mix to the standard result is 1.0005. This difference may be solely due to differences in abstracting methods and does not

imply case-mix creep has occurred. Case-mix creep must be measured over time.

Suppose then at some time T+1 the same study is completed where records are abstracted using the same standard methodology for a given period. If the ratio of the MTF resulting case-mix to the case-mix resulting from the standard abstracting methodology remains at 1.0005, then case-mix creep has not occurred. If, however, the ratio is greater than 1.0005, then case-mix creep has occurred and appropriate adjustments could be implemented. If the ratio is less than 1.0005, case-mix reduction due to coding practices has occurred.

The recent full deployment of the Encoder/Grouper affords an opportunity to measure the impact of the availability of the Encoder/Grouper on resulting case-mix measures. In the example above, a sample of medical records abstracted by the MTF prior to Encoder/Grouper deployment would be considered the sample at time T. FY91 or FY92 medical records may serve this purpose. A sample of records abstracted during FY93 would be considered the sample at time T+1. An independent abstractor may then be used to abstract the same sets of medical records. The MTF abstracted and independently abstracted records may be grouped, case-mix computed, and a measure of inpatient case-mix creep can then be determined.

The study may be repeated at a future date (call this time T+2), however, only one set of records need to be abstracted. For example, FY94 MTF abstracted records could be compared to FY94 independently abstracted records. The data from time T (FY91 or FY92), T+1 (FY93), and T+2 (FY94) may then be grouped using a common grouper, case-mix computed, and a measure of case-mix creep between any of the three periods may then be determined.

2.4.2 INPATIENT CASE-MIX CHANGES DUE TO UPDATED GROUPER VERSIONS

The monitoring of case-mix changes over time also includes analysis of changes due to updated grouper versions. This apparent change in average case-mix should be quantified in order to ensure that IWUs are consistently defined from year to year. Consistency can be achieved through the use of case-mix correction factors that isolate the portion of case-mix change that is strictly due to DRG grouper updates.[1]

CMI correction factors are computed by assigning two versions of DRGs to the same year's data and comparing the resultant workload. For example, the difference in CMI between Version 4 DRGs and Version 8 DRGs is computed by comparing the DoD-wide CMI based upon these two versions of DRGs for the same year. Using FY90 data, the Version 4 CMI using direct care specific outlier criteria was 0.8581, while the Version 8 CMI, using CHAMPUS outlier criteria, was 0.8491. The ratio of the Version 8 to Version 4 value is 0.9895, which indicates that, on average, each MTF would have a CMI that is approximately 1.05% lower strictly due to the fact the grouper was updated from Version 4 to Version 8 software, case weights, and outlier criteria.

In order to ensure that the IWU is consistent at a global level over time, a correction factor based upon this result is necessary during IWU computation. The basic formula for the computation of an IWU is:

$$\text{IWUs} = \frac{\text{CMI}}{.8109} * \text{MEPRS dispositions}$$

Precisely speaking, this definition is only accurate for IWUs based upon Version 4 DRGs, which were used in the original formulation of the IWU.

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[1]Case-mix changes due to grouper updates for the direct care is considered in greater detail in **Development and Impact of Implementing FY91 (Version 8) CHAMPUS DRG Weights and Outlier Criteria**, VRI-DMIS-2.60 WP92-5, Vector Research, Incorporated, 20 May 1992.

In order to correct for apparent changes in case-mix due to grouper updates, a correction factor must be added to the IWU definition. Thus, the generic IWU definition would be:

$$\text{IWUs} = \frac{\text{CMI}}{(.8109 * \text{CMI Correction Factor})} * \text{MEPRS dispositions}$$

This definition is generic in the sense that it is not sensitive to the DRG version with which CMI is computed, whereas the former definition should only be applied to CMIs based upon Version 4 DRGs.

As a result, the corresponding correction factor for each DRG grouper update must be calculated each year in order to accurately compare IWUs over time. Further, the above analysis must be completed to distinguish changes that are attributable to upcoding at MTFs from changes due to grouper updates.

2.4.3 AMBULATORY CASE-MIX CHANGES

As with inpatient workload measures, artificial ambulatory case-mix changes must be measured and corrected in order to provide useful ambulatory workload measures over time. The ambulatory case-mix may be defined as the average AWU credit per visit. AWU "creep" may result from purposely shifting visits in workcenters with lower weights to workcenters that have higher weights, unbundling of care episodes previously reported as a single visit into multiple visits, and similar methods of artificially increasing measured workload.

Given limited ambulatory cost and workload information, the methods for monitoring ambulatory case-mix changes are limited. Since the AWU weights represent the average cost per visit, artificial changes in workload that do not have concurrent increases in costs, will result in a decrease in the AWU weights. If the AWU weights are updated annually, these updates will adjust for substantial changes in measured workload

without appropriate changes in observed expenses. Additionally, the distribution of visits may be reviewed at the workcenter level to monitor unanticipated changes in visit volume within specific clinical areas and subaccounts.

2.5 MAINTAINING DIRECT CARE COST MODELS

Direct care cost models that reflect the relationship between direct care workload and expenses are developed and maintained by the DMIS. These cost models are used in resource allocation analyses and budget reviews, MTF economic analyses, and are targeted to be included in the RAPS model. The models support case-mix adjusted cost comparisons with CHAMPUS provided care, and therefore may also be used in "make versus buy" decisions at the MTF or service area level. Further, the models provide a means for the objective review of MTF productivity and efficiency relative to Service and peer group averages. The table below summarizes the inputs, outputs and impacts of maintaining DMIS direct care cost models.

Summary of the DMIS Direct Care Cost Model Maintenance

Summary of Inputs:

- 4th Quarter cumulative MEPRS data for each Service;
- inpatient workload by MTF in the form of IWUs;
- ambulatory workload by MTF in the form of AWUs;
- Graduate Medical Education (GME) resident and interns and average daily patient load (ADPL) for medical centers; and
- financial data from the Services by UIC, object class, and program element code.

Summary of Outputs:

- revised direct care cost model parameters for each Service and facility type (medical center, CONUS community hospital, overseas hospital, clinic); and
- summary report on cost model parameter stability.

-- Continued --

Summary of the DMIS Direct Care Cost Model Maintenance (Concluded)

Summary of Impacts:

- Direct care cost models can be used to project MTF and Service budget requirements.
- Direct care cost models are used by OASD(HA) in MTF economic analyses.
- RAPS is targeted to incorporate direct care cost models during annual updates.
- Local make vs. buy decisions are supported by providing a means of comparing DRG level costs with those observed in the CHAMPUS program.

The same basic cost models serve multiple functions, therefore providing consistency throughout OASD(HA) financial analyses. The direct care cost models support OASD(HA) resource allocation through adjustments that expresses resource requirements in terms consistent with DoD budget requirements.[1] Regardless of the application, the direct care models require maintenance and updating to reflect potential changes in DoD healthcare resource intensity, practice, and policy.

The maintenance and update of the models may be divided into two components. Some changes, such as updating DRG case weights and outlier criteria, or inflation considerations, are minor and appropriate compensation may be completed without recomputing the cost models. Other changes may require re-estimating the model parameters to ensure the model forms are appropriate and specific parameter adjustments are stable. Section 2.5.1 briefly describes re-estimating the model parameters and section 2.5.2 discusses methods for maintaining and updating the cost models without re-estimating model forms and parameters.

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[1] Development of cost models to support DoD resource allocation of Operations and Maintenance (O&M) resources for Program Elements 0807711 and 0807792 is found in **DRG-Based Resource Allocation Methodology Enhancements**, VRI-DMIS-2.60 WP92-9, Vector Research, Incorporated, in progress.

2.5.1 RE-ESTIMATING COST MODEL FORMS AND PARAMETERS

It is a somewhat subjective decision as to whether the model parameters and forms should be re-estimated or simple updates to the parameters are sufficient. In general, the model forms and parameters should be re-estimated every two to three years. Comparison of results using original and re-estimated parameters will determine whether updating all impacted systems is warranted. Of course, if substantial changes occur that impact the workload measures or cost reporting methodology, then the model forms and parameters should be re-estimated with the most currently available data.

The cost models were updated from FY88 based models to FY90 based models to include recent changes in policy including the implementation of CHAMPUS outlier criteria, inclusion of Brooke AMC within the Army rather than the Air Force, and changes in MEPRS facility reporting structures as four Navy clinics began reporting workload and expenses through parent facilities rather than independently. While any one of these changes may not warrant re-estimating the cost models, in combination it was decided that these changes were sufficient for justifying re-computing the model parameters.

The development of FY90 based direct care inpatient and ambulatory care cost models is documented in **FY90 Based Cost Models to Support Diagnosis Related Management**[1]. This document serves as a reference for future re-computation of model forms and parameters. The steps completed to re-estimate the models and measure the stability of model parameters are described in detail in the above document. Additionally, the validation of the FY90 based cost models is presented in **DRG-Based**

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[1] VRI-DMIS-2.60 WP92-11, Vector Research, Incorporated, in progress.

Resource Allocation Methodology Enhancements[1]. The methodology for re-estimating the models is briefly summarized below.

Recomputing the cost models provides a mechanism for each individual MTF's relative changes in workload and cost to be considered. Cost model re-estimation requires complete MEPRS data. The inputs required to update the models are listed in the above provided table. MEPRS facility level inpatient and ambulatory costs, workload in terms IWUs and AWUs, and graduate medical education data, are processed for analysis. With facility costs as the dependent variable, regression analysis is completed for inpatient clinician, inpatient nonclinician, and ambulatory models. The regression results are examined for extreme outliers or other indications of data errors. If erroneous data are thought to be present, these observations are removed from the data set and the regression equations are recomputed.

The results of the estimation process are then compared to direct care cost model parameters from prior years. These comparisons are performed to confirm that major changes in the relationship between workload and expenses have not occurred. If strong evidence of changes is present, the issues are raised with OASD(HA) for resolution. Lacking any significant issues, these cost models are made available to OASD(HA) for use in the RAPS model, MTF economic analyses, and to the Services for resource allocation analyses.

The application of the cost models to support resource allocation requires the update of factors that convert MEPRS expenses into Service financial dollars for program elements 0807711 and 0807792.[2] The factors should be recomputed and monitored each year to ensure that they

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[1] VRI-DMIS-2.60 WP92-9, Vector Reseach, Incorporated, in progress.

[2] Program element 0807711 refers to regional health facilities while 0807792 refers to station hospitals and clinics.

remain relatively stable within each Service branch. Details concerning the computation of these multipliers is presented in **DRG-Based Resource Allocation Methodology Enhancements.**[1] In short, financial data from the Services are provided to the DMIS and processed into standard tables that summarize expenses and obligations by UIC, program element code, and object class. These data are aggregated for PECs 0807711 and 0807792 and matched with MEPRS data (correcting for roll-up differences) to compute conversion factors. Evidence of substantial changes requires the issue be raised with OASD(HA) for guidance on the resource allocation methodology.

As opposed to re-estimating the model forms and parameters each year, OASD(HA) plans to update the model parameters to reflect new workload measures, inflation, and adjustments due to case-mix changes. The methods for updating the models are described in the next section.

2.5.2 UPDATING AND MAINTAINING THE COST MODEL PARAMETERS

The direct care cost models should be updated annually to reflect inflation, new DRG Grouper software, case weights, and outlier criteria, updated AWU weights, and adjustments for artificial inpatient and ambulatory case-mix changes. Methods for updating the cost model parameters are described below. Barring delays in CHAMPUS FY93 (Version 10) Grouper software, associated DRG weights, and outlier criteria, it is anticipated that FY93 direct care cost models will be available by mid-November, 1992 as shown in the timeline in exhibit 2-1.

2.5.2.1 Updating Parameters Due to Changes in Workload Measures

The cost models do not need to be re-estimated each time the Grouper software, DRG case weights, outlier criteria, and AWU weights

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[1] VRI-DMIS-2.60 WP92-9, Vector Research, Incorporated, in progress.

are updated. To update the inpatient model parameters for new inpatient workload measures, simply multiply the marginal cost parameter for both the inpatient clinician and nonclinician models by the following factor:

$$\frac{\text{Total IWUs in Model Peer Group (Base Grouper, Weights, Criteria)}}{\text{Total IWUs in Model Peer Group (New Grouper, Weights, Criteria)}}$$

Exhibits 2-5 through 2-7 present the FY90 based unadjusted direct care cost model parameters and model forms for each Service. Note that the model forms are the same for each Service and the only difference is in the value of the model parameters. Thus, for example, to update the Army medical center inpatient nonclinician cost model, the factor above would be computed using IWUs for all Army medical centers. Then, B_1 would be multiplied by this factor. The process is simply repeated for all model peer groups for both inpatient clinician and nonclinician cost models.

The process is quite similar for ambulatory cost models. The adjustment factor below is used to update the ambulatory models:

$$\frac{\text{Total AWUs in Model Peer Group (Base AWU Weights)}}{\text{Total AWUs in Model Peer Group (New AWU Weights)}}$$

Thus, for example, to update the Army medical center ambulatory cost model, the factor above would be computed using AWUs for all Army medical centers. Then, B_1 would be multiplied by this factor. As before, the process is simply repeated for all model peer groups.

2.5.2.2 Updating Cost Model Parameters Due to Inflation

The cost models must be updated to reflect changes in the costs of inputs that impact the cost of delivering health care. Inflation factors to be applied to the fixed and marginal cost parameters will be provided by OASD(HA) in accordance with OSD Comptroller price escalation indices.

EXHIBIT 2-5: ARMY FY90 BASED MEPRS EXPENSE MODELS

	Medical Centers	CONUS Community Hospitals	Overseas Hospitals	Clinics
Inpatient Nonclinician	$7,950.864	$830.668	$511.118	---
Intercept	$1.653	$1.920	$2.402	---
IWU	4.00%	---	---	---
GME Adjustment				
Inpatient Clinician				
IWU	$0.170	$0.110	$0.160	---
Ambulatory				
Intercept	$8,340.005	$1,145.694	$1,422.539	$912.860
AWU	$1.983	$2.039	$2.442	$2.624

Note: Dollars in Thousands

EXHIBIT 2-6: NAVY FY90 BASED MEPRS EXPENSE MODELS

	Medical Centers	CONUS Community Hospitals	Overseas Hospitals	Clinics
Inpatient Nonclinician	$8,256.241	$1,050.640	$492.380	---
Intercept	$1.717	$2.429	$2.314	---
IWU	4.00%	---	---	---
GME Adjustment				
Inpatient Clinician				
IWU	$0.164	$0.148	$0.146	---
Ambulatory				
Intercept	$10,720.051	$1,426.679	$1,378.740	$945.764
AWU	$2.548	$2.540	$2.367	$2.719

Note: Dollars in Thousands

EXHIBIT 2-7: AIR FORCE FY90 BASED MEPRS EXPENSE MODELS

	Medical Centers	CONUS Community Hospitals	Overseas Hospitals	Clinics
Inpatient Nonclinician	$8,511.257	$891.182	$441.230	---
Intercept	$1.770	$2.060	$2.074	---
IWU	4.00%	---	---	---
GME Adjustment				
Inpatient Clinician				
IWU	$0.135	$0.110	$0.096	---
Ambulatory				
Intercept	$8,912.379	$1,182.404	$1,185.337	$729.482
AWU	$2.119	$2.105	$2.035	$2.097

Note: Dollars in Thousands

2.5.2.3 Updating Parameters to Reflect Artificial Case-mix Changes

To prevent increases in projected costs due to artificial increases in measured workload, the cost model parameters may be adjusted to compensate for changes in inpatient and ambulatory case-mix indices that are not due to actual changes in resource intensity. Methods for measuring and monitoring case-mix changes are described in section 2.4. To adjust the model parameters, for either inpatient or ambulatory case-mix creep, simply multiply the appropriate marginal cost parameter(s) by:

$$\frac{1}{1 + C}$$

where C is the anticipated artificial increase in workload. For example, if one expects a 2.0% artificial increase in ambulatory workload, then the ambulatory marginal cost parameters should be multiplied by 1/1.02. Note that if adjustments for case-mix changes are directly reflected in workload measures, the model parameters need not be adjusted.

Having described the methodology for maintaining the direct care cost models, and briefly summarized steps and referenced detailed procedures for re-computing the cost models, the next section discusses updating the MTF Peer Groups. Note that all procedures for maintaining the cost models are discussed in detail in **DRG-Based Resource Allocation Methodology Enhancements**.[1]

2.6 UPDATING MTF PEER GROUPS

The development and maintenance of DoD peer group designations is performed in support of DMIS and other OASD(HA) activities that require the categorization of similar MTFs. The MTF peer groups updated by the

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[1] VRI-DMIS-2.60 WP92-9, Vector Research, Incorporated, in progress.

DMIS are used in RCMAS and by OASD(HA) in Composite Health Care System (CHCS) resource estimation modeling. These peer groups are not the model peer groups described in previous sections of this document, which are based simply on facility Service branch and facility type (medical center, CONUS community hospital, overseas hospital and clinic). The MTF peer groups used by RCMAS and CHCS are based on more detailed facility characteristics. A summary of the inputs, outputs, and impacts of the MTF peer group update process are summarized in the table below.

Summary of the DMIS Peer Group Update Process

Summary of Inputs:

- Relative Case-Mix Index (RCMI);
- Average Daily Patient Load (ADPL); and
- MTF location and teaching status information.

Summary of Outputs:

- MTF Peer Groups; and
- summary report of MTF peer group shifts by individual MTFs.

Summary of Impacts:

- MTF peer groups are updated each year and should also be updated in applications using peer group information. Current OASD(HA) applications which utilize peer groups are RCMAS and CHCS cost modeling applications.

The methodology used to determine MTF peer groups, and the development of FY91 peer groups based on FY91 (Version 8) Grouper software and associated weights and outlier criteria, are presented in **FY91 Peer Groups.**[1]

2.7 MAINTAINING DMIS DATABASES AND REPORTS

The DMIS draws from the numerous processes outlined in the sections above to create standard tables of workload information each fiscal year (or quarter) to support the monitoring and analysis of MHSS utilization and costs. This information ranges from patient-level data sets

[1] VRI-DMIS-2.60 WP92-16, Vector Research, Incorporated, 15 July 1992.

archived for analysis to aggregate workload measures for ad hoc queries. The maintenance of workload measures in the DMIS database and the respective reporting software is summarized in the table below.

Summary of the DMIS Workload Measurement Report Maintenance

Summary of Inputs:

- list of valid DRGs and names for each grouper version;
- patient-level data with DRGs and RWPs assigned;
- direct care, CHAMPUS and Medicare DRG weights and cutpoints for each fiscal year;
- MTF peer groups for each fiscal year;
- direct care cost model parameters;
- aggregate IWUs and AWUs by MTF, workcenter, and beneficiary type; and
- MEPRS 3rd level expense, workload, and staffing FTE data.

Summary of Outputs:

- Aggregate DMIS Oracle tables with IWUs and AWUs by MTF;
- Patient-level inpatient discharge records with DRG and workload assigned;
- Comparative reports of direct care, CHAMPUS and Medicare DRG weights and outlier criteria;
- DMIS Oracle tables with MTF peer groups; and
- DMIS facility profile reports.

Summary of Impacts:

- requires periodic DMIS Oracle database updates;
- provides direct care source data to RCMAS;
- provides direct care weights and outlier criteria used by DMIS and at MTFs by Encoder/Grouper and RCMAS;
- provides standard and ad hoc DMIS reports on historical MTF workloads and costs;
- establishes the inputs for the projection of MTF workloads and expenses by RAPS;
- workloads and estimated costs used to determine direct care/CHAMPUS comparative costs at the catchment area level; and
- assists in the monitoring of quality, cost, and accessibility of MHSS care.

The inputs to these DMIS databases have been described in previous sections of this chapter. Some example outputs have also been presented in previous sections, and all outputs are available from the DMIS and OASD(HA). In general, OASD(HA) and the DMIS provide a wide variety of

models and reports in electronic and hard copy format. The systems and reports available provide aggregate and detailed population, workload, and cost information by catchment area, beneficiary status, facility, and various demographic categories. Additionally, cost and utilization comparisons between CHAMPUS and the direct care systems, as well other civilian care sources, are readily available in electronic and hard copy format..

OASD(HA) and the DMIS provide many information systems, models, and tools to support the management of health care within the MHSS. This document has summarized DMIS standard procedures used to support MHSS cost and workload measurement and monitoring. In addition, ad hoc analyses can be completed upon request through OASD(HA).